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FOREIGN NEWS ON CITRUS FRUIT

THE SICILIAN LEMON INDUSTRY

by

EDWIN SMITH

Marketing Specialist in Fruits and Vegetables Department of Agriculture

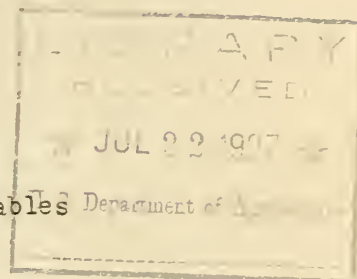


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PRINCIPAL CITRUS FRUIT PRODUCING CENTERS OF SICILY



THE SICILIAN LEMON INDUSTRY

Lemon production has reached enormous proportions on the northern and eastern coasts of Sicily. In fact, Sicily is the principal source of the European lemon supply and also furnishes an important part of those used in the North and South American markets. Sicily also provides much of the world's supply of citric acid and lemon oil.

Lemon production on the mainland of Italy is of relatively little importance, although the fruit is grown commercially in many districts south of Naples. The lemon industry on the Italian mainland is centered largely between Naples and Salerno and on the west coast of Calabria. The Island of Sicily, however, produces around 90 per cent of the entire Italian lemon crop.

Centers of production

The main centers of lemon production in Sicily are in the vicinity of Palermo, Messina and Catania. Although intermediate districts along the coast line produce lemons, these districts are accredited to one or other of the larger cities. The production of lemons south of Messina, in the vicinity of Roccalumera, for example, is more important than in the immediate vicinity of the port of Messina. The heaviest plantings in the Catania section are at the base of Mount Etna, north of the city of Catania, centering at Acireale, Giarre, Mascali and Fiumefreddo. Immediately south from Catania practically no lemon groves are to be found until the vicinity of Augusta is reached. The plantations in the province of Siracusa are scattered, reaching as far southward as Avola.

Lemons are produced along the coast, plantings seldom being more than 500 feet above sea level. The mountains in Sicily and Calabria rise to a height of several thousand feet very close to the coast line, in some instances rising directly out of the sea, so that for the most part, only a narrow coastal strip is available for fruit growing. The mountains are dry and barren, destitute of vegetation save on the benches where olive trees are planted or where the soil is such that the mountain sides may be terraced for grapes. The general appearance of the terrain closely resembles the foothill areas in the interior of Washington or Oregon, though where water is available and on the lower levels the sub-tropical vegetation gives the country a remarkable likeness to Southern California.

The possibilities for citrus fruit production in Sicily are much greater than are at first realized, however, since all along the coast, river valleys have cut indentations into the mountains affording large areas for the cultivation of lemons. This is especially noticeable along the east coast in the vicinity of Roccalumera, Mascali and Fiumefreddo. These are little more than coulees or washes, since the streams are dried up during the summer. The margins of the rocky washes are walled up and the floors of the valleys are planted. In some instances the mountain sides bordering the valleys have been terraced and planted with lemons to an altitude of a few hundred feet, while in other places olive trees still cover the steep inclines.

From Fiumefreddo to Catania the coast skirts the base of Mount Etna for about twenty miles. Here the terrain takes a long, easy slope upwards toward the volcanic giant and differs distinctly from the Sicilian coast to the north. The arable land is somewhat broken up by the rugged rock of former lava flows, but nevertheless is a rich agricultural land and supports a population of nearly 1,000 to the square mile. The productive volcanic soil is used largely for grape production, though at many points lemon plantations are to be observed.

From Messina to Palermo, lemon plantations are to be seen at various points all along the north coast. The local districts are not large, however, until Bagheria is approached. From this point until after Palermo is passed, the mountains are more or less broken up into large butté formations with a big amount of coastal floor land available. The immediate vicinity of Palermo consists of a huge basin, set back in the mountains by the convergence of several valleys and facing the sea. During ancient times this was an important grain producing area. Olive trees followed the grain and citrus trees followed the olives. In recent years there has been a recession in the area of citrus trees in favor of other fruit and vegetable production.

Soils used for lemon production

The soil upon which Sicilian lemons are grown varies to a marked degree as does the quality of the fruit grown thereon. The best shipping lemons are grown on clay soils. In the Palermo district, reputed for lemons of good carrying quality but not for finish or high lemon oil content, we find a soil varying from clay mixed with coarse gravel, being the disintegration of limestone rock of seashell origin, to clay.

Most of the lemons of extremely high quality and finish, grown from Messina southward to Taormina, are grown on a very gravelly soil with varying mixtures of clay and sand. Some of this soil on the higher levels is of such sheer gravel that the concrete walls of the terraces are made by mixing Portland cement with the soil as shoveled up on location. In the bottom lands more clay and sand were observed.

The highly productive areas at the base of Mt. Etna from Fiumefreddo to Catania have fine ashy soils of volcanic origin. They produce heavy yields of coarse lemons, poor in color and of weak shipping qualities but which give good yields of oil and are consequently heavily utilized for by-products. One exception to this is reported in the vicinity of Acireale where there is a pocket of soil having a mixture of clay which produces exportable lemons. In general, the light, sandy soils produce small, pale and weak lemons, while the clay soils produce strong, deep green fruit which usually brings a premium on account of its long keeping qualities.

One erroneous impression current regarding Sicilian lemon production is that the major part of the fruit is grown on terraces running up the mountain sides. This is not the case. The production at Palermo and a large part of that on the east coast comes from bottom lands or slopes, and

might be likened to the San Fernando Valley, or to some parts of the Santa Paula area of California. Terrace production is confined to a fringe, extending upward to an altitude of from 300 to 500 feet above sea level. In many sections there is a very small amount of terrace production on account of irrigation difficulties. It is true that some of the areas at the base of Mt. Etna are terraced, but this is due more to the customs of the country than to necessity. Many of these inclines would be utilized in California without terracing.

Climate

The climate in Sicily is made very equable through the influence of the Mediterranean. Frost is scarcely known in the lemon areas and at the times of its rare occurrence lasts but a few hours. In the summer, day temperatures are high, though the mean daily summer temperatures are around 75° F. The mean daily temperature of January is about 50° F. The greatest climatic hazards are the hot sirrocco winds from the Sahara Desert. These not only are disastrous to foliage, but when they occur at blooming time or shortly afterward, cause a serious drop. If the lemons are fully set liberal irrigation at the time of these hot, dry winds will save the crop. The rainfall occurs during the winter months. From May until November irrigation is necessary in lemon production. The average rainfall is about 30 inches at Palermo.

The following tabulation shows rainfall and temperature data for Palermo and its surrounding territory:

Month	: Mean annual precipitation :	: Mean daily temperature
	: in inches per month :	: per month
	: <u>Inches</u> :	: <u>Degrees</u>
		: <u>Fahrenheit</u>
1926	:	:
January	4.0	50
February	3.3	51
March	2.8	54
April	2.6	58
May	1.3	64
June	0.6	71
July	0.3	76
August	0.5	77
September	1.5	73
October	3.8	67
November	3.9	59
December	4.8	53
Total	29.4	

Trend in lemon production

Lemon production in Sicily showed a steady increase for twenty years prior to 1908. Despite the growing competition of California, the exportation

of fresh fruit increased steadily up to the beginning of the war, when important markets in Central and Eastern Europe were shut off from Italy. The production of by-products consequently increased heavily during the war period. However, production on the whole has been on the decline since 1914.

Owing to the facts that lemons are being top-worked, cut out and replanted all of the time, and that gardens are irregular, often taking sites on mountain-side terraces, statistics of area cannot be ascertained with exactitude; but owing to the fact that a predominating part of the lemons grown are either exported or converted into by-products which are exported, statistics on production should be accurate, though it is difficult to have production statistics from two sources agree.

The following table gives the production of lemons in the six most important producing provinces of Italy over a period of years:

LEMONS: Production in six important provinces of Italy,
1914-1925 a/

Year	Sicily	Calabria	Campania	Apulia	Liguria	Sardinia	Total
	: 1,000	: 1,000	: 1,000	: 1,000	: 1,000	: 1,000	: 1,000
	: <u>pounds</u>	: <u>pounds</u>	: <u>pounds</u>	: <u>pounds</u>	: <u>pounds</u>	: <u>pounds</u>	: <u>pounds</u>
1914	: 814,600	: 31,305	: 59,745	: 16,755	: 13,839	: 4,850	: 941,144
1915	: 855,826	: 37,478	: 44,533	: 15,873	: 14,991	: 1,764	: 970,465
1916	: 1,072,758	: 39,903	: 55,556	: 16,094	: 22,046	: 3,968	: 1,210,325
1917	: 562,173	: 33,730	: 51,367	: 8,377	: 21,605	: 3,748	: 681,000
1918	: 670,639	: 44,092	: 56,658	: 8,157	: 18,078	: 4,850	: 802,474
1919	: 674,828	: 38,801	: 40,565	: 12,787	: 12,566	: 3,968	: 783,515
1920	: 638,011	: 37,699	: 41,887	: 12,125	: 13,669	: 3,968	: 747,359
1921	: 560,950	: 33,730	: 54,454	: 13,889	: 12,125	: 2,646	: 667,694
1922	: 652,341	: 39,242	: 50,926	: 16,535	: 3,307	: 1,984	: 764,335
1923	: 628,531	: 36,155	: 22,707	: 14,109	: 3,086	: 3,086	: 707,674
1924	: 653,884	: 47,619	: 37,037	: 13,669	: 1,764	: 1,984	: 755,957
1925	: 643,302	: 47,178	: 30,203	: 13,889	: <u>b/</u>	: 1,543	: <u>c/736,115</u>

Compiled from Notizie Periodiche di Statistica Agraria, 1915-1926.

a/ These provinces produced approximately 98 per cent of the total national production of citrus fruit for each of the years shown. b/ Province omitted in 1925. c/ Does not include Liguria.

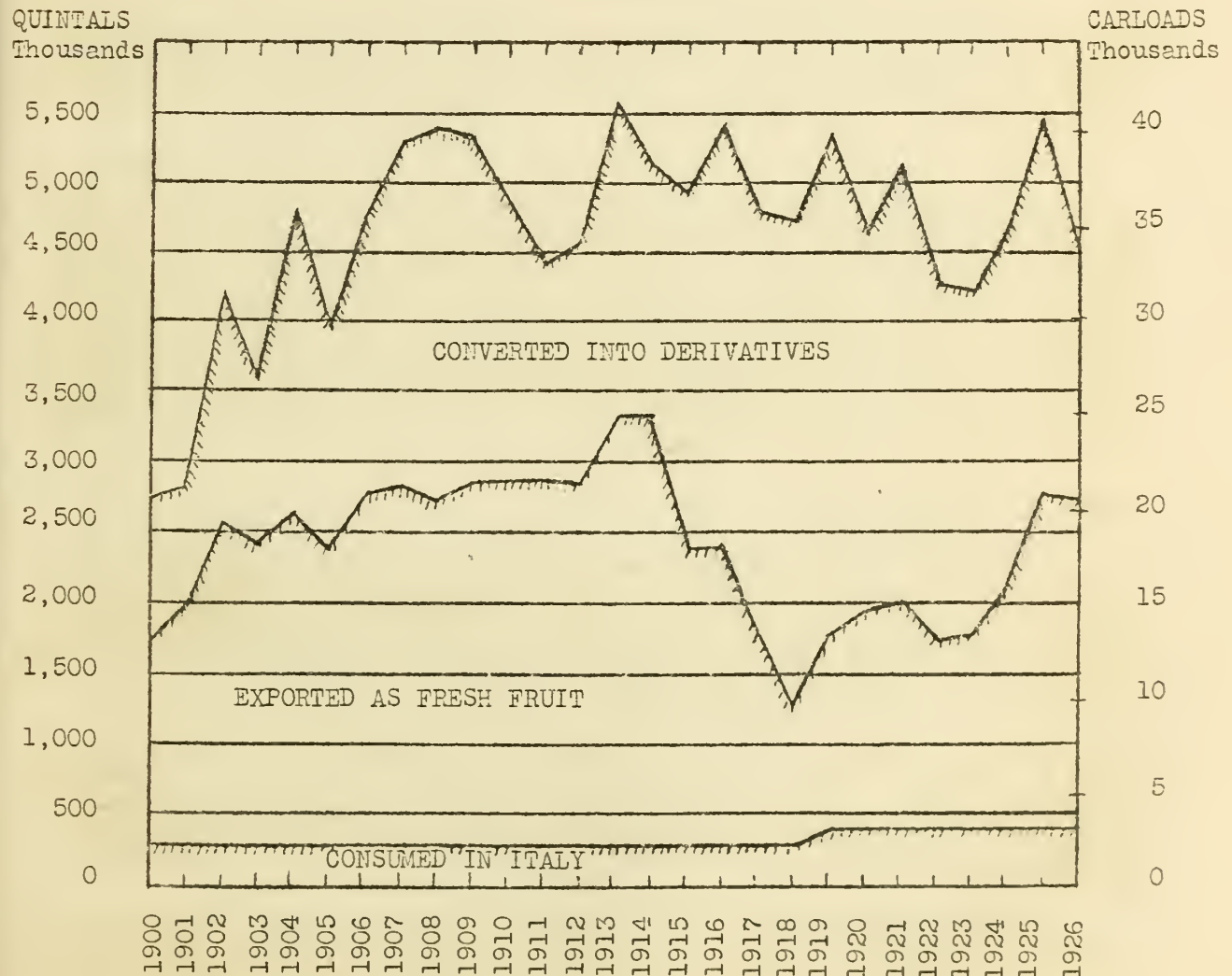
From a report of the Bank of Sicily, considered to be reliable by the American Consular Service, the area devoted to lemons in Sicily in 1925 amounted to 52,138 acres, of which 23,227 were in the province of Palermo, 16,556 in Messina, 7,413 in Catania, 3,459 in Siracuso, 988 in Trapani, and 494 in Caltanissetta.

Italy's lemon production of 736,115,000 pounds in 1925 is equivalent to 9,947,500 California boxes. Exports from Italy during 1925 were equivalent

to 7,078,250 California boxes, which left only 2,869,750 boxes for home consumption and manufacture. The actual production of citrate of lime, concentrated and crude lemon juice during 1925, however, should account for approximately 8,078,000 boxes, not to mention a probable 1,192,000 boxes used for home consumption.

The following graph is being presented to show what is considered a truer picture of production from 1900 to 1926. Production from 1900 to 1924 was plotted by a competent Italian authority on citrus production, while the years 1925 and 1926 were plotted from official export statistics from Italy, the calculations having been based on exportation of crude and concentrated lemon juice, and annual production of citrate of lime.

Lemon Production in Italy



Varieties and types of trees

The development of different varieties of lemons in Sicily has not been given much attention so that the names of distinct varieties are not common knowledge among growers and shippers. Instead of referring to varieties, lemons are usually classified according to the time of the year when harvesting takes place. Thus, we have "limoni" as referring to the normal or new crop, picked largely during the months of November, December, January, February and March. The July or August normal blossoms produce a late winter crop called "Bianchetti", which is frequently allowed to remain on the trees until early in May. These lemons are very weak, poor in acid and juice contents. The well known "Verdelli" lemons are summer lemons produced by artificially forcing heavy bloom in August. Late "Verdelli", maturing during the autumn, are called "Pastardi."

A careful study most likely would reveal distinct varietal types in any one district, but these have not been so segregated as to be recognized by members of the industry. This, no doubt, is the result of individual nursery propagation. When going from district to district, decided differences are noticed in the fruit, but this is probably due to soil conditions more than to varietal differences.

The lemon trees are of a very upright nature, even when grown individually. All are erect and slender in the groves because of close planting. The foliage varies with districts and treatment. In the Palermo section, foliage is very sparse and the trees seem lacking in vigor. The same condition is observed on the East Coast where the plantations are exposed to the winds; where protected and well taken care of, the trees in districts between Messina and Catania have reasonably good foliage and seem vigorous. This is especially true with trees between 5 and 15 years of age. The bearing surface of individual trees is very small, there being small production other than in the tops of the trees.

Methods of production

The size of the orchards or gardens is not large. In Palermo they are estimated to be from $3\frac{1}{2}$ to 5 acres. Observations from Messina southward would suggest the same size, although occasionally orchards of ten or twelve acres are to be seen. They are largely worked by the owner who only employs labor for hoeing, pruning or picking. All gardens are walled in so that it is necessary to make a visit in order to inspect the general appearance of the trees or crop, unless some elevated point is selected so that a "bird's-eye-view" of several hundred acres may be had. In many districts the grower does not live on his property but has his residence in a village or city, a custom dating back to the age when walled towns were necessary for the security and well being of the inhabitants of a country.

Most producers grow their own nursery stock. Small dependence is placed on commercial nurseries for new trees. Bitter orange seedlings are used on account of their root vigor and resistance to diseases. When two years old, the orange seedlings are budded from $1\frac{1}{2}$ to 2 feet above the ground. Planting takes place two years after budding.

The trees are planted about 15 to 20 feet apart. There is seldom any regularity as to planting in rows. As the orchard work is all done by hand, planting is done in those spots where the orchardist deems it the most advisable to have a lemon tree. He may have a medlar, orange, walnut or olive tree which he wishes to plant next, or which he desires to preserve from some previous planting.

Starting in March the orchards are given three or four hoeings during the summer. This is done with a heavy pointed mattock or hoe called a "zappa". The soil is well stirred and no weeds are allowed to grow during the early part of the season. After hoeing the soil is left with irrigation trenches 8 or 9 inches deep, making basins about the trees.

About the first of May irrigation starts. This practice is very varied, much depending upon the character of the soil and water supply. In some places water is applied by flooding the basins at intervals of 15 days; in other places, such as on sides of hills with gravelly soil prevailing, the trees are watered at intervals of 8 days. In the old days wells and a mule-operated pump were depended upon for water. Today gravity, water and electricity, furnished by hydro-electric plants, are displacing the mule and incidentally making more land available. In some districts electricity is had at very reasonable rates.

The closeness of the plantings calls for different methods of pruning from those practiced in California. The lateral limbs, leaving the trunk of the tree at about three feet from the ground, take an upright growth, with bearing surface elevated from 6 to 18 feet from the ground. In most groves there is plenty of room to move about beneath the bearing surface, which may be likened to a canopy. No small limbs are left to bear fruit in the center of the tree. Consequently, pruning consists of thinning out the bearing surface, cutting out dead limbs and in removing new shoots in the center of the tree. This is done in March and April.

Some spraying is done, applying lime and sulphur with hand spray outfits. The amount of pest control, however, is very limited and in the average orchard probably more time and expense are put on "tree doctoring", that is, butting out split or decayed areas, than in spraying. One of the most serious diseases is "mal secco", resembling the citro-necrosis or "citrus blast" in California. Prof. L. Savastano at the R. Stazione di Agrumicoltura e Frutticoltura at Acireale is of the opinion that the disease, which has taken on serious proportions on the East Coast, affects the base of the trunk and roots as well as the twigs, leaves and fruit. He also believes that there is a relationship between susceptibility and the continued forcing for Verdelli crops and has cautioned against the annual forcing of the tree, recommending that Verdelli production be restricted to every third or fourth year and that the trees be kept in full vigor by rational fertilizing and irrigation. Prof. Savastano's opinion on the relation of "mal secco" to Verdelli production is disputed in some quarters and forcing for summer production is increasing on the East Coast. This situation presents more than a mild threat to future production in Sicily.

Practices of applying fertilizer also vary to a marked degree. Most orchardists prefer to use barnyard manure and it is universally used in amounts that depend upon its availability. Some growers keep stables of cows for this purpose, working up ferns and weeds, gathered from the mountains, in the compost mixture. Others buy manure from the towns.

The principal commercial fertilizer used is sulphate of ammonia. Great variation exists in amounts and times of application. From 5 to 8 pounds per tree were the usual amounts given. In districts where a Verdelli crop is sought the fertilizer is applied late in the summer, but where the cropping is normal the sulphate is hoed into the soil at about the time of the first irrigation in the spring, and this occurs prior to the heavy blooming season. Barnyard manure is applied throughout the year. Experiment station authorities state that the trees need more phosphates, but that it is difficult to influence growers to use it.

The production of the Verdelli crop

Lemons matured as a summer crop are called Verdelli. Such crops are produced in Sicily by artificially forcing a late summer bloom. Ordinarily, the Sicilian lemon tree blossoms in the spring with periods of maximum bloom in early June and mid-July. If a grower sets out to produce a crop of Verdelli, the trees are left without irrigation for several weeks in July. In the heavier soils the roots are partially uncovered in order to accentuate the droughty affect. When the leaves begin to dry up, irrigation is again turned on concurrently with a heavy application of fertilizer. This enforced growth brings on another peak blossoming period, while the drought causes most of the normal crop to drop to the ground, leaving the fruit from this late, artificially induced bloom to mature as a "Verdelli" crop. However, if humid conditions prevail fewer of the normal or "bianchetti" lemons drop and their remaining on the tree reduces the number of Verdelli that will mature.

In the Palermo district it does not seem possible to force more than one Verdelli crop in three years. On the East Coast, in vicinities like Roccalumera, they are producing a Verdelli crop on the same trees every year, and in some groves taking off winter lemons as well. Professional horticulturists state that such forcing will cut in half the life of the lemon trees, but this seems to have no reactionary effect upon the practice because current opinion is that Verdelli production is rapidly on the increase.

Harvesting and marketing

The Sicilian grower is a cash seller, a thousand lemons being the unit of sale. It is universally understood that 1,040 fruits are to be delivered for a unit of a "thousand". In the Palermo district sales are sometimes made on the basis of allowing 120 kilos (265 pounds) for a thousand lemons in order to save counting, but this probably applies more to the sales made to by-product factories than to packing houses; in some instances packing houses buy that way.

Except for the Verdelli crop and a few of the November cut, which are sometimes put away in ordinary warehouses for two or three months' storage, no green lemons are picked. Even the Verdelli are well colored and only a few in the early part of the season would be what a California packer might term "silver". Most of the lemons of the summer crop in the Messina district have a beautiful white appearance at picking time. In other districts, especially in Catania, the fruit takes on a more golden hue.

The grower does his own picking. The pickers move from ladders, breaking the stems and placing the fruit in small baskets. When the baskets are full they are lowered to the ground where women cut the stems close to the "buttons", using sharp knives. The lemons are then placed in piles. In some districts the growers roughly pack the lemons in old boxes, furnished by the packer, for carting into town where packing is done. The lemons may be wrapped for such packing or, with those less careful, partially wrapped, or with sheets of paper between the layers. When wrapped by the grower the fruit is unwrapped by the exporter, the paper being straightened out at the packing house and used again. Wrapping by the grower is generally practiced at Palermo and Messina. Farther south this is not always done. At Acireale, lemons were brought in from the growers in large, padded baskets, holding about 100 pounds, without any packing whatsoever. The distance of the market and the time of the year influence some packers as to the degree of care used in handling lemons prior to packing.

The washing process is entirely eliminated. The lemons usually appear bright and clean without washing. Very little delay is entailed between picking and shipment and save for a minor quantity sorted in November, it seldom happens that ten days elapse between the time of picking and that of shipping. Sales are made by the grower to a packer and shipper through a broker who is trained in estimating crops and in arriving at good bargains with growers. The packer accepts the fruit in the growers' orchard. Hauling is done in two-wheeled, springless carts drawn by mules or donkeys. The roads are usually very rough. Where lemons are hauled from the groves in boxes, packing house arrangements are simplified, since basket hauling requires much floor space for dumping and sorting. Where done, the floor and walls are covered with straw or are padded, and the lemons are piled to a depth of about three feet.

Packing

What appears to be a very well organized packing house at Messina may be described as follows: The room, about 30 by 70 feet, was designed for two "set-ups", one of which was working. This consisted of four men packers; twenty-four women sorters and wrappers; four small girls for transferring wrapped lemons to the packers; two girls for preparing the packed boxes for the nailer; two small boys to carry empty boxes, paper, etc.; two adult porters to carry the lemons in and out of the packing room; one girl to sort and straighten papers; and one overseer.

The packers worked at benches along the longitudinal walls, with backs to the walls, each packing bench facing a row of padded bins and a row of twelve sorters, seated in parallel rows. The porters carried in the boxes of lemons as brought from the orchard, and the small boys opened them. The twenty-four women took the lemons from these boxes, unwrapped and rewrapped them, and then distributed them according to size and grade in the row of padded bins toward the packing benches. The four small girls transferred the wrapped lemons to the boxes of the packers and put extra colored wraps on lemons for the crown of the pack. It remained only for the packers to arrange the lemons in the boxes.

As soon as packed, the woman attendant "dressed up" the box with lining paper, and nailed on a cleat and paper guard on top of the center bulkhead of the box. The nailer, using the half-round sapling hooping material affixed to the box, nailed down the lids while in position on the bench, where the packer finished. Then, with a short-handled adze, he chopped off the overlapping top pieces, fair with the end of the box, and the package was ready to be carried by the porter into the stock room. In other packing establishments the sorters are divided into two groups, the first removing wraps and sorting into bins according to grade, the second picking up, rewrapping and sorting into a second row of bins according to size.

The operation, though completed by many hands, runs smoothly and quietly. There is no talking; everyone is busy, but no one seems overworked. A room with four packers will turn out 160 boxes in eight hours, the usual working day. In observing other rooms, the number of sorters ran from five to six per packer, but the number of boxes per packer was always stated to be from 40 to 50 when working ten hours.

Grades and sizes

Sicilian lemons are sorted into two shipping grades, "first choice" or "Primissima", and "second choice" or "Prima". Those discarded as culls or "scarto" are utilized in by-product plants. No general standards prevail for these grades and packers change their standards from time to time depending upon the season and the market for which the fruit is packed. The boxes are stenciled with the packers' mark rather than being labeled. Considerable colored paper is used as well as some tinsel in finishing off the top of the pack. When moving by ship, the boxes are roped.

Most of the fruit is graded into two sizes, 300's and 360's, the diameter of the fruits being slightly less than fruits packed under these sizes in California packing houses. A larger size, slightly greater in diameter than a California 300, is packed in a special half-case as 150's, and marketed in Great Britain and Germany. The 300 size is used mainly for the American trade, except when the demand is strong in the Southern States, where 360's are preferred.

The lumber for boxes is largely imported from Yugoslavia, and consists mostly of beech, though some ash and other woods are used at times.

It arrives as boards and is cut up to the desired dimensions with band saws on the packers' premises by the packers' men, or in an adjacent building by one specializing in box manufacture. The old-fashioned Italian style of packing was a square pack with a very high crown. Some markets still prefer this style but packing is going more and more to the American style which, according to their interpretation, is an offset pack with a comparatively low crown. All such packages are marked "American Style". The inside measurements of the box used for this packing are 27" x 13" x 11" and the gross weight of the pack when ready for shipment ranges from 84 to 90 pounds, depending upon the packer and whether the boxes are wet or dry. It is stated that Hamburg brokers weigh the boxes, as light weight boxes denote irregular sizing. Knowing this, some packers select the unseasoned or otherwise heavy boxes for Hamburg consignments.

Marketing and transportation

Practically none of the Sicilian lemon packing houses are situated on railway trackage or alongside wharves. After packing, the lemons are loaded in two-wheeled carts, or on ox-drawn wagons and hauled to the railway yards or to the wharves. In the latter instance, they are loaded on lighters and thus transferred to the ships anchored nearby.

Cheap water transportation is one of the features that has made Sicily the foremost producer of the world's supply of lemons. Sicilian lemons can be marketed in most of the countries of Northern Europe at less expense than the cost of shipping the California fruit to the Rocky Mountain States. Freight rates of 36 cents per box to England and only slightly greater to the other northern countries, have always made lemons one of the cheapest fruits available on the markets of Northwestern Europe. Exports to the interior markets of Central Europe are made by railway, loaded cars being ferried across the Straits at Messina.

LEMONS: Exports from Italy by countries, 1924-26

Countries	Year ending December 31		
	1924	1925	1926
	Pounds	Pounds	Pounds
Austria	18,308,983	24,635,303	23,188,644
Czechoslovakia	20,763,364	19,999,029	26,874,515
Hungary	8,210,371	9,829,430	13,219,563
Yugoslavia	6,384,081	8,115,794	10,989,490
France	26,033,019	19,741,091	26,268,470
Germany	88,117,642	122,860,374	124,729,654
United Kingdom	89,044,896	99,390,202	114,405,733
Russia	3,468,056	5,483,061	1,332,240
Switzerland	15,603,497	16,131,499	11,513,524
Turkey in Europe	9,864,483	12,682,623	14,592,688
United States	46,483,330	110,188,554	75,237,707
Other countries	55,254,771	74,729,545	76,216,991
Total	387,536,493	523,786,505	518,569,319

Compiled from Statistica del commercio speciale di Importazione e di Esportazione, 1926.

Lemons moving from Sicily by ship to England, Holland, Germany and Denmark are consigned for sale at auction in the port markets, while shipments that are made quickly by rail to Central and Eastern European markets are sold on firm order, as are shipments to Norway and Sweden. Such markets as Cologne, Munich, Dresden and Berlin in Germany buy heavy supplies of lemons on order, payment by draft accompanying bill of lading, and fill in their temporary needs by placing orders in the auction markets of Rotterdam, Bremen and Hamburg.

Formerly, heavy movements were made to New York on consignment for sale at auction. Successive losses, owing to our protective tariff and California's increasing competition, however, have caused a decline in consignment shipping, so that all packers are at present looking for orders before making shipments to America. However, during the summer months when lemon prices in America stand the best chance of being above costs, and when weather conditions may cause values to temporarily reach extremely high levels, some of the large Italian exporters plan to consign moderate quantities to New York. By the same reasoning, it is possible that some American speculators plan to order a certain amount of fruit for summer shipment. The general feeling of the Italian exporters is that the American market is lost and they are now making readjustments to do without it.

Italian exporters often have friends of their own nationality in the ports where consignments are made, and to whom they consign their lemons. These people ordinarily secure a lower rate of selling commission and work on this margin.

Development of the Russian market has been taking place recently, and increasing shipments are being made to fill orders from the Soviet Government. It is expected that this trade will show some growth, but little hope is held for any considerable development in that direction for several years to come, in view of the fact that Russia was not a big consumer of lemons before the war and that the consumptive power of the country is in a much worse state now.

Few native Sicilian packers and exporters are in a position to finance the cash buying, packing and exportation of lemons in large quantities. It is customary to buy lemons in advance of the harvest season and to make an advance at the time of purchase. On order business, the financing of operations is fairly simple, since the packer has documents to use as collateral. However, large quantities marketed in Great Britain and Germany are not bought on order. This necessitates accepting advances from auction brokers and is frequently done through the resident branches or affiliations of the Italian houses in the foreign cities.

In port markets such as Glasgow, Liverpool, Manchester, London, Southampton, Hull, Rotterdam, Hamburg, Bremen and Copenhagen, lemons are sold at auction by the brokers who have financed their consignment. Frequently the shipper has his Italian representative attending the auction sale. After deducting selling costs, freight, and cash advances, the auction broker remits returns. In Great Britain, Germany, and Denmark, "Eat more fruit" propaganda campaigns are stimulating the sale of lemons, especially during winter months.

LEMON DERIVATIVES

Since 1914 over half of the lemons produced in Sicily have been manufactured into derivatives, wholly or in part before leaving the country. These consist mostly of citrate of lime, lemon oil, citric acid, concentrated lemon juice, lemon peel in brine, dried lemon peel, unconcentrated lemon juice and pomace.

The production of lemon oil and citrate of lime from culls or "scarto" has been long established in Sicily. Gradually, as production increased, lemons other than culls were utilized for the manufacture of derivatives. The use of fruit other than culls was accentuated by the rapid increase in production about 1908, by the increase in the United States tariff on lemons, and, later, by the marketing crisis brought about during the war years.

At the present time the manufacture of lemon derivatives is lightest during the summer months. Only culls are then utilized unless the price of lemon oil is high enough to enable the factories to compete in price with the exporters when securing fresh lemons. This situation existed during the summer of 1926. During the winter months, especially during early and mid-winter, when the fruit is maturing in volume, and when returns for fresh lemons are low, the factories are very busy and constitute the most important outlet for fruit.

The proportion of the crop utilized for lemon derivatives varies greatly in the various districts. In a section such as Palermo, which has good export facilities and which produces good shipping lemons with inferior oil content, only about 30 per cent of the season's crop goes into by-products. In other sections, producing a relatively inferior shipping lemon, but with high acid and oil content, as may be found at the base of Mt. Etna, as much as 80 per cent of the year's crop may go to the factories. Moreover, the forcing of trees for Verdelli production frequently causes much of the crop to mature in early winter when shipping prices are low.

Plants for lemon derivatives

Originally the manufacturing establishments utilizing cull lemons were comparatively simple, and only the crude by-products were turned out, consisting of lemon oil and citrate of lime. Many of such plants are still in operation in Sicily today. In them boys cut the lemons in half and skillful women workers ream out the pulp of the lemon with miraculous speed, using a special spoon-shaped knife. Men workers take the peel between thumb and fingers, twist and rub it while immersed in a sponge, bringing pressure against the outer surface of the skin by a small stick or "beam" across the top of an earthen bowl. The oil flies into the sponge and is caught in the earthen bowl. A worker will extract about two Sicilian pounds (Sicilian pound = 12 ounces) of oil per 8 hour day.

Where working on the basis of pounds of oil extracted (27.2 cents per pound), three or four pounds might be produced in a longer working day. This product has to undergo a distillation process for rectification before it can be marketed.

The juicy pulp of the fruit is carried to a grinding machine from whence it is pitched into a bin and mixed with chaffy straw prior to being placed in straw mats for pressing. Hydraulic presses have replaced the hand presses for removing the lemon juice. After straining, the juice is pumped into a vat where it is mixed with powdered calcium carbonate and hydrated lime. Steam is applied and the mixture is heated to 68° or 70° Centigrade. The sludge-like mass is filtered, placed in sacks for removal of excess water under a press, then placed in an oven for further dehydration. The final product is citrate of lime, which is marketed on a basis of 64 per cent citric acid content.

During the past fifteen years great strides have been made in Sicily in developing equipment to replace, or supplement, these simple plants that then converted lemons into by-products. Foremost among the changes have been the conversion of citrate of lime into citric acid. The average exportation of citric acid from Sicily for the five years prior to 1913 was 338 quintals (74,515 pounds) annually, and of citrate of lime 60,271 quintals (13,287,345 pounds) annually. By 1920 the exportation of acid had increased to 18,283 quintals (4,030,670 pounds), while the exportation of citrate had increased only to 87,771 quintals (19,349,995 pounds). 1/ During 1926, 4,544,342 pounds of citric acid and 10,132,562 pounds 2/ of citrate of lime were exported.

When the tariff of 17 cents per pound was placed on citric acid imported into the United States, methods were devised to convert lemons into a product further removed than citrate of lime from the finished citric acid, but which would not face a tariff barrier when entering the United States. This product is concentrated lemon juice and is the juice of the lemon with part of the water removed and containing about 85 per cent of the citric acid in an equal weight of citrate of lime. During the fiscal year ending November 30, 1926, Italy exported 2,294,107 pounds 3/ of concentrated lemon juice, equivalent to about 1,256,622 pounds of citric acid. This illustrates the facility with which the citrus industry in Sicily may convert its practices and methods in order that its derivatives will best meet market conditions.

Oil extraction

At the present time the greatest energy is being directed along lines that will improve methods of oil extraction. Each year more oil is being extracted by mechanical means. Competent authorities state that from 20 to 25 per cent of the lemon oil produced in Sicily in 1926 was extracted mechanically.

At the present time mechanical extraction is done by equipment operating on two general principles, that is, the type of "nut-meg grater" that acts upon the surface of the lemon without smashing the fruit, and the type that smashed the fruit, breaking the skin into small pieces and

1/ La Riforma Sociale Anno XXIX, Vol. XXXIII, Torino, Italy.

2/ Chas. A. Livengood, United States Trade Commissioner, Rome.

3/ Consular Report.

thoroughly grinding the pulp, then separating the liquids from the pomace in a press. In the former type the crude oil is caught beneath the grater, while in the second it is separated from the lemon juice by centrifuges or vacuum pan stills.

Mechanical processes of oil recovery are rapidly displacing hand methods, the efficiency of which in securing a maximum recovery is highly variable. Early mechanical processes secured a low oil yield and a very inferior oil. Modern equipment, however, is giving a higher yield than hand methods, although the quality of the oil is still inferior to that produced by the sponge method. At the present time, most producers of finished lemon oil blend oil produced mechanically with that produced by hand so that the quantity of pure hand extracted oil going on the market is small.

It is believed that industrial investigations now in progress will soon develop equipment which may produce lemon oil superior in quality to that recovered in sponges. No information is being given out to the public as to the nature of this equipment, but costs of production are thought to be high. This handicap will tend to cause only a gradual displacement of the hand methods, since the demand of the superior oils for purposes of blending has given them a value commanding a premium of from 10 to 20 per cent over mechanically recovered oil of low quality.

Research on lemon derivatives

The Italian Government maintains an experimental station at Reggio, Calabria, for the investigation of citrus derivatives. It is known as R. Stazione Sperimentale per L'Industria Delle Essenze e Dei Derivati Degli Agrumi. This station is maintained by the Ministry of Agriculture under the direction of Dr. Alfredo Parrozzani. Originally the station was established to provide the means of making official analyses of bergamot oil for producers in the area of Reggio. Gradually, the research side of the station's work has developed to out-balance the commercial analytical work, although that has increased from 1,500 samples in 1920 to 2,000 in 1926.

At present the staff has four chemists and its equipment consists of laboratories, library and a variety of apparatus for oil recovery. As an adjunct to the station, gardens of about four acres and distillery equipment are maintained on the outskirts of the city for work on essential oil from flowers. Here various varieties of citrus, roses, jasmine, narcissus and other floral plants are propagated for purposes of experiment and dissemination to growers. This side of the work is also augmented by additional gardens on the high plateau of Santo Stefano d'Aspromonte. Although a great deal of the station's effort and equipment is being devoted to essential oils from flowers, the season during which this work is at its height supplements the winter season when research work on citrus oils occupies the attention of the staff. The station has also been developing means of deriving pectin from orange peel, but has not put methods into commercial application as yet.

The research technologists of this station are closely in touch with industrial oil producers. The Fabbrica Chimica Arenella of Palermo has a laboratory with ten chemists, part of whom devote their attention to research work, with an industrial engineer who has under his survey the entire field of new developments in citrus derivative production.

Relation of derivatives to fresh lemon marketing

The production of lemon derivatives in Sicily has a far greater influence on the fresh lemon market than is the case in California. It is estimated that a grower can accept from 50 to 75 cents less per thousand for his lemons when selling to a factory than when selling for export. This is because little care is required in picking and in some cases the lemons are whipped off from the trees and picked up. Therefore, many growers would rather sell for 25 lire (\$1.25) per thousand to a factory than to sell for 40 lire (\$2.00) per thousand to an exporter. For this reason the source of supply to the exporter is apt to be curtailed when the price of lemon oil goes up above a certain point. Under California's present system of storing, packing and marketing, there is not this possibility of rapid diversion of marketable lemons to by-products. In August 1926, the price of lemon oil reached a point where factories could afford to pay as high as 60 lire per thousand. (The exchange at that time made this equivalent to about \$2.00 per thousand.) This took lemons out of the market for export.

The California producer is at present under a great handicap when attempting to turn out the same standard of oil as the Italian. Important among the advantages which the Italian manufacturer has over the California producer are those accruing from having freshly picked lemons to work upon. The Italian manufacturer has an immediate source of pure sponge-extracted oil which may be secured for blending with his machine-made oil at rock-bottom prices. Therein he has distinct advantages in raising the quality of his cheaply manufactured oil and in keeping uniform its quality when produced at different times of the year or from fruit grown under a great variety of conditions.

His disadvantages, however, probably outweigh the advantages since it is more difficult for him to spread out his period of operation. When fresh lemon prices are high in Italy the manufacturer of derivatives is restricted to culls, the supply of which, owing to non-standardized grades, is inversely in proportion to the fresh lemon demand. He must compete with the exporter. This tends to increase his overhead expense. In addition to the custom's duty facing the citric acid manufacturer when marketing in the United States, one of his principal markets, the manufacturer of this product has to buy his supplies of citrate of lime from a source setting an artificial price and levying a charge which amounts to a surtax to the manufacturer.

The prices that the manufacturer can pay for fresh lemons vary constantly on account of the fluctuating price of lemon oil. The price of citrate of lime remains more constant since it all has to be sold at prices

which are set by the government controlled Camera Agrumaria. This gives temporary stability to one of the products of manufacture, though whether or not this price control is of permanent advantage is a subject for debate. During the past year it has been stated that oil production accounted for about 60 per cent of the gross revenue of cull lemons, citrate of lime (or other juice derivatives) for about 36 per cent and pomace or other peel products for the balance. Lemon oil brought very high prices during certain months and thus caused this ratio to stand differently than it would during other years.

Concentrated lemon juice

During the past three years the increase in the production of concentrated lemon juice in Sicily has been one of the outstanding features among their lemon derivatives. The increase in exports has been from 82 short tons in 1923 to 1,135.3 short tons in 1926 (calendar years).

In some plants lemons are received directly from growers and juice is extracted from the crushed fruit; in other plants the juice is received from smaller by-product plants. The oil is removed and the volume of the juice is reduced by evaporation until the outturn contains an average of about 55 per cent citric acid. This is run into wooden casks and exported for purposes of citric acid manufacture.

Italian manufacturers state that it is more expensive to manufacture concentrated lemon juice than citrate of lime; that it stands a charge of 120 lire per 64 kilos of citric acid content by the Camera Agrumaria as against 100 lire by citrate of lime; that it takes a higher freight rate and still has to go through the citrate of lime process before being made available as citric acid. Its principal advantage is that it enters the United States duty free. If its utilization is possible without being transformed into citric acid, it has a further advertising advantage of being a "fresh fruit" product.

In the face of all of its reputed handicaps, it will be interesting to observe if future production increases or decreases. If it does not decrease it is patent that this method of manufacture has been successful in avoiding at least a portion of the protection intended to be furnished California lemon growers by the United States import tariff on lemons, citric acid and citrate of lime.

LEMON DERIVATIVES: Trend of production and trade in Sicily

Year	:Citric Acid:	:Citrate of Lime	:Concentrated Lemon:	Lemon Oil
	: Exports	: Production	: Juice Exports	: Exports
	: 1,000 pounds	: 1,000 pounds	: 1,000 pounds	: 1,000 pounds
1907-13	:	:	:	:
(average)	:a/ 75	:a/ 12,523	:	:a/ 1,019
1920	:a/ 4,031	:a/ 12,436	:	:a/ 1,331
1923	:b/ 2,933	:c/ 16,108	:b/ 163	:b/ 1,400
1924	:b/ 4,256	:c/ 16,445	:b/ 1,500	:b/ 1,653
1925	:b/ 6,120	:c/ 18,120	:b/ 2,248	:b/ 1,712
1926	:b/ 4,544	:c/ 11,003	:b/ 2,271	:b/ 1,371

a/ La Riforma Sociale Anno XXIX, Vol. XXXIII, March-April, 1922.

b/ Trade Commissioner Chas. A. Livengood, Rome. c/ Unofficial.

From the foregoing, it is to be observed that there has been considerable change in the output of derivatives secured from the juice of lemons but that in lemon oil, which may be taken as an accurate index of the quantities of lemons utilized for derivatives, there has been quite a steadily increasing production. Owing to reserve stocks of citrate of lime, the quantity of citric acid manufactured and exported will not show the effects of the increasing exports of citric acid in the form of concentrated lemon juice until sometime in the future. It is possible that concentrated lemon juice exportations will affect shipments of citrate to a far greater degree than it will citric acid.

The Camera Agrumaria

Between 1900 and 1906 the production of citrate of lime in Sicily increased very rapidly. The marketing was centered through few hands and as production kept mounting an attempt was made to maintain prices by carrying over a surplus. But in a couple of years' time this economic fallacy fell upon the heads of those concerned and a crisis prevailed. As the Government had just intervened in a crisis in the sulphur industry, its attention was called to the citrate of lime situation and on July 5, 1908, what is known as the Camera Agrumaria was formed for controlling the marketing of citrate of lime. The Camera had the right to buy and sell citrate of lime and this product could not move upon the railways nor be exported without its license. Its object was to take out of commerce and warehouse stocks of citrate so as to stabilize its price. Advances were made to producers in anticipation of future sale of their citrate, financing being done by borrowing upon the security of the stored commodity. The Camera Agrumaria has operated along the lines of the Coffee Valorization scheme in Brazil. It has not limited production directly, though its influence on net returns to producers may have had this effect at times.

It was not necessary to entrust the sale of citrate to the Camera but fees charged for selling outside were so high as to effectually bring a sales monopoly to the body. Thus during 1909 and 1910 stocks were stored and producers were advanced a limited amount against citrate deposited. These advances were very much less than the good prices received in 1906 and 1907. Following this a marked falling off in citrate production was to be observed, so that by 1913 no surplus stock needed to be carried over, whereas sales prices had increased from \$14.16 per 100 pounds during the first year of the Camera's operation to \$15.99 per 100 pounds in 1914.

The war brought on a new situation. A tremendous amount of lemons could not be marketed as fresh fruit and was manufactured into citrate of lime and citric acid. Prices and demand for acid were stimulated, but stocks piled up faster than they could be sold with the result that the post-war crisis of 1920-21 found the Camera with a carryover of nearly 8,818 short tons of citrate of lime and production varying from 7,716 to 11,023 tons per year.

Now followed an era of hectic action in all departments of Italian life and politics, and it is believed that the Camera was no exception. Its debts in 1921 mounted to \$4,504,500 and its stocks to over 22,496 short tons.

However, by 1922 an amortization scheme was adopted as a part of the Camera's policy, and a start was made toward reducing stocks and paying off indebtedness. A good demand for citric acid and a currency inflation in the meantime have been of great assistance so that better progress toward this end has been made than was anticipated.

The following tabulation gives the annual production sales and stocks of citrate of lime in Sicily from 1900 to 1925-26.

CITRATE OF LIME: Annual production, sales and surpluses in
Sicily, 1900 to 1925-26

Year	Production	Export or sale	Stock
	<u>Short tons</u>	<u>Short tons</u>	<u>Short tons</u>
1900	3,413	3,493	151
1901	2,879	3,000	---
1902	6,192	6,145	77
1903	4,490	4,314	582
1904	5,579	5,314	217
1905	4,989	5,107	79
1906	5,056	5,057	78
1907	6,465	5,636	896
1908	8,066	7,720	551
1908-09 ^{a/}	8,138	2,478	6,210
1909-10	6,174	6,691	6,290
1910-11	4,993	8,322	2,961
1911-12	5,963	7,621	1,303
1912-13	3,849	5,152	---
1913-14	7,458	7,458	---
1914-15	8,524	8,524	---
1915-16	11,357	9,052	2,805
1916-17	8,234	8,234	2,805
1917-18	10,050	5,777	7,078
1918-19	11,824	3,482	15,420
1919-20	6,218	12,857	3,781
1920-21	14,464	1,004	22,241
1921-22	8,390	13,603	17,025
1922-23	8,053	4,904	20,174
1923-24	8,228	9,094	19,009
1924-25	9,060	11,857	16,541
1925-26	5,500	10,041	12,001

^{a/} From this date the figures are for the fiscal year ending November 30.

The indebtedness of the Camera Agrumaria, which in 1921 was \$4,504,500, was reduced as of November 30, 1926, to approximately \$1,448,400. Thus, with 12,001 short tons of citrate of lime on hand the Camera might liquidate and have a surplus of either several million lira or several thousand tons of citrate. This is a most remarkable development in the history of this body in view of the fact that advances made in 1921 were on the basis of \$1.46 per 100 pounds in anticipation of sale at \$1.95 per 100 pounds, whereas the prices that this surplus actually sold for are said to have been from \$1.17 to \$1.36 per 100 pounds. However, with the exception of a period in 1922-23, the value of the lire kept shrinking until August 1926. The paying off of indebtedness in a depreciated paper money, as well as the sinking fund realized by keeping advances well below the sale price, is responsible for the outcome.

At the present time the Camera Agrumaria has two sources of revenue for the amortization of its indebtedness. When the exportation of concentrated lemon juice promised to cause vast quantities of potential citrate of lime to leave the country without paying toll to the Camera, a ministerial decree was issued so that in 1923 concentrated lemon juice was taxed at the rate of \$5.78 per 100 pounds of citric acid content, although the Camera takes no part in the marketing of this product. This has subsequently been reduced to \$4.87 per 100 pounds, and again to \$3.65 per 100 pounds of citric acid content, where it stands at present. During 1926, this would have realized approximately \$38,894.

On citrate of lime the Camera has fixed minimum selling prices and a fixed minimum of returns for the duration of each fiscal year, ending November 30. In May, 1927, the Camera was selling citrate of lime at \$14.69 per 100 pounds and advancing \$12.24 per 100 pounds to producers, while \$12.24 per 100 pounds was the minimum price agreed upon below which they would not make sales before November 30, 1927. Should the sale price be lowered to the minimum, the Camera might reduce its advances to producers, but not below \$9.80 per 100 pounds during this period.

With the reduced production of citrate of lime it does not appear probable that the price in gold will be reduced, though it is possible that a continuation in the upward trend of the value of the paper lire may cause the Camera to reduce its margin between selling price and advances to producers to something less than \$2.44 per 100 pounds.

COST OF LEMON PRODUCTION

During March 1923, the Consorzio Agrumaria of Palermo prepared a table of costs for growing lemons in Palermo, using a grove of four hectares, equal to about 10 American acres, with 1,800 trees, as a base. The figures were checked by Consul Edward I. Nathan and found relatively accurate. By applying present material and labor costs to these data, and using rates of exchange supplied by the United States Department of Commerce for the stated periods, it is possible to produce the following table:

Items of expense	Pre-war cost, 1912-13 a/				Cost in 1922-23 b/				Cost in 1926-27 c/			
	Rate per unit	Total cost 4 hec--tares	10 acres	Dollars	Rate per unit	Total cost 4 hec--tares	10 acres	Dollars	Rate per unit	Total cost 4 hec--tares	10 acres	Dollars
<u>CULTIVATION</u>												
Hoeing in March, 170 days	2.50	425	82.04		11	1,870	89.05	16	2,720		136.00	
Cutting cross irrigation ditches, 112 days	2.50	280	54.05		11	1,232	58.67	16	1,792		89.60	
Hoeing in August, 140 days	2.50	350	67.57		11	1,540	73.33	16	2,040		102.00	
Binding and removing wood after clipping in Sept.-Oct., 56 days	2.50	140	27.03		11	616	29.33	16	896		44.80	
Irrigation, 40 days	3.00	120	23.17		15	600	28.57	18	720		36.00	
Water, 16,800 cu.m.	0.10	1,680	324.32		0.50	8,400	400.00	0.03½	5,600		280.00	
Fertilizer mat., calculating manure spread once in 3 yrs. 600 trees	per cu.m.				per cu.m.			per cu.m.				
Pruning 600 trees	2.00	1,200	231.66		10	6,000	285.71	7	4,200		210.00	
Total cultivation	1.00	600	115.83		5	3,000	142.86	6	3,600		180.00	
		4,795	925.11			23,298.1	1,094.43		21,568.1		1,078.40	
<u>HARVESTING AND TAXES</u>												
Filling 2,700 boxes at the orchard	Lira				Lira			Lira				
	per box				per box			per box				
Taxes	0.60	1,620	312.74		3.00	8,100	335.71	4.50	12,150		607.50	
General supervision		600	115.83			3,000	142.86		3,000		150.00	
Total harvesting and taxes		1,000	193.05			5,000	238.10		5,000		250.00	
		3,220	621.62			16,100	766.67		20,150		1,007.50	
Grand total		8,015	1,547.50			39,398.1	1,876.10		41,716.2		2,085.90	
Cost per box at orchard, unpacked		2.97	.57			14.55	.69		15.45		.77	
a/ Converted at 5.18 lira to the dollar. b/ Converted at 21.00 lira to the dollar. c/ Converted at 20.00 lira to the dollar.												

The following f.o.b. costs of lemons may be considered conservatively high. In substantiation of this, we have the statement from exporters that Sicilian growers will "make ends meet when receiving 45 lira (\$1.75) per thousand", or an equivalent of 58 1/3 cents per box if selling for export, or a lower figure, corresponding with a smaller harvesting cost, if selling to factories. The discrepancy between 58 1/3 cents and 77 cents per box can be accounted for by reason of the bias of the exporters' opinion and the fact that certain items for labor in the 77 cent figure are abnormally high since the wage scale used was on a 1926 basis when the value of the lire was as low as 3.2 cents in the month of July. As soon as wage scales are adjusted to the present higher gold value of the lire, considerable shrinkage in computed production costs will follow.

LEMONS, PACKED: F.O.B. costs per box at Palermo, 1922-23 and 1927

Item of expense	Cost in 1922-23:		Cost in 1927	
	Lira	Dollars	Lira	Dollars
Cost of fruit	14.55	.69	15.45	.77
Transportation to packing house :				
and broker	2.00	.09	2.00	.10
Nails, paper, hoops	2.25	.11	1.80	.09
Porter .....		.25		.01
Sorters and wrappers		1.00		.05
Packer .....		.52		.03
Nailer .....		.11		.01
Foreman .....		.06		.003
Clerk .....		.06		.003
Rent .....		.15		.007
Taxes .....		.10		.005
Repairs to boxes .....		.25		.01
Porters, sorters, packers,				
nailers a/	3.00	.14	2.50	.13
Empty box	5.00	.23	5.00	.25
Cartage and lighterage .....	.75	.24	.45	.02
Total costs f.o.b. Palermo ...	27.55	1.30	27.20	1.36

a/ Covering packing house supervision and overhead.

Wages in Sicily, based on an eight hour day in April, 1927, were as follows:

Per diem Wages in Sicilian Lemon Industry

Item	Amount	
	Lira	Dollars
Orchard laborers and pickers ...	16.00 - 18.00	.80 - .90
Packers and box makers	21.30 - 23.00	1.07 - 1.15
Women, boys and girls, sorters, etc.	7.10 - 9.00	.36 - .45
Packing house foremen	22.30 - 24.00	1.12 - 1.20
Clerks	22.30 - 24.00	1.12 - 1.20

Production costs were computed without regard to returns on investment since these are usually looked upon as net above costs. The value of lemon groves in different parts of Sicily vary according to the net returns. The rich soils at the base of Mt. Etna are said to be worth from lira 30,000 to 50,000 per hectare (\$609.60 to \$1,016.00 per acre) without trees. Very good Verdelli groves on the East Coast are reported to be worth lira 240,000 per hectare (\$4,876.80 per acre), while average groves about Palermo would be valued at lira 80,000 per hectare (\$1,625.60 per acre).

When marketing lemons in New York the following costs are involved:

ITALIAN LEMONS: Cost of marketing in New York

Item	Cost per box
	<u>Dollars</u>
F.O.B. cost of lemons	1.36
Margin to exporter .....	.25
Insurance, banking and wharfage .....	.02
Freight, Palermo to New York at 1/7d. less 4d. ....	.54
United States tariff at 2 cents per pound	1.46
Labor, New York Fruit Exchange for drawing and displaying samples in auction room .....	.02
Inspection by the New York Fruit Exchange .....	.00 $\frac{1}{4}$
Cartage of samples, cooperage, etc. (estimated) ..	.02
Importer's commission, 3%) 6% .....	.229
Auction commission, 3%)	3.90
New York Auction selling price	

General condition and outlook in the Sicilian lemon industry

During 1926, the Sicilian lemon producer had a very prosperous year. The grower received up to lira 60 (\$2.33) per thousand for cull lemons, whereas the price for the finest Verdelli at times was above lira 100 (\$3.89). Owing to a variety of causes, principal among which have been fluctuating fresh fruit prices and unstable currency, the exporters and manufacturers of derivatives do not seem to have fared so well during 1926.

The Sicilian lemon industry during the current season is in the same difficult plight as all other Italian industries on account of currency stabilization and wages. It has not been possible to reduce wages much from the high point reached when the value of the paper lire declined until it was worth only 3-1/3 cents. Lemons and lemon products have to be sold on a gold basis. The grower and laborer are at present expecting the same number of paper lira per unit of fruit or labor as last year, although at times the value of a lire has gone as high as 5 $\frac{1}{2}$ cents.

There has been some reduction in material costs, such as imported fertilizers and box material, and there is no doubt that a readjustment will be effected in all lines in due course. The present situation, which is tending to restrict trade, is expected to continue until the currency ceases to appreciate and readjustment with growers and laborers is complete.

There is no question but what the acreage of producing lemons in Sicily has decreased during recent years much faster than statistics reveal. Two or three years ago high prices were paid for tangerines to be used for oil extraction and this caused many lemon trees about Palermo to be top-grafted to this fruit. It is estimated that in the immediate vicinity of Palermo as much as 20 per cent of the lemon area was top-worked or replanted to tangerines. Many of the growers who transformed their lemon groves are now regretting it. No doubt some of these trees will be worked back to lemons. Recent lemon prosperity is causing new plantings to be made. Taken as a whole, it is difficult to forecast the trend of lemon production. Judging from the appearance of many of the trees in the Palermo area, an observer familiar with California conditions would predict an early decrease in production. The longevity of the lemon tree and its productivity under Sicilian conditions should cause hesitancy in making such a prediction.

My opinion is that if prices for fresh lemons, lemon oil and citric acid produce a return to the grower equivalent to lira 40 (\$2.18) to 45 (\$2.45) per thousand, production will remain about stationary. But if prices of fresh lemons, lemon oil and citric acid products prevail as they have during recent years, it is only a question of time before a gradual growth in production will take place.

The available sites for new lemon plantings in Sicily are by no means occupied. In the vicinity of Mt. Etna the land that might produce lemons appears to cover a great area. In and about Palermo, gardens that are only partially planted to lemons are in abundance. In the past, irrigation has largely depended upon a gravity flow of water or pumps operated by donkeys; the present development of hydro-electric power in Italy seems certain to make many mountain slopes on the north and east coast of Sicily, now covered with olive trees, potential lemon sites.

Furthermore, the possibilities of increased Sicilian lemon production on land now planted are very great, were the tracts to be thrown into maximum production by universal adherence to modern principles. Though one hears much in Sicily of the inability of the growers to change their methods, it is easily within the realm of possibility for new methods to be invoked, whereby trees will be spaced to give a maximum producing surface; whereby water and fertilizers will be provided to give an improved and rejuvenated foliage; and whereby waste from plant diseases and insects will be more effectively reduced. Many things formerly considered impossible are now very possible by royal decree, providing problems pertain to Italian production that affects the welfare of the state. The lemon industry is not without evidences of a trend in this direction.

For these reasons it would seem apparent that the future of Sicilian lemon production is wholly dependent upon competitive production not solely competition with the California lemon grower, but competition between the net profits from lemons and those from other fruits and early vegetables that might be grown in the same sites. Italy's rejuvenation during the past five years has been conducive to the production and export marketing of such products that compete with lemons for the use of the soil.